

**Lake Erie
Fisheries Assessment Unit
Report 1988 - 5**

Winter Creel Surveys on Inner Long Point Bay, Lake Erie, 1978-1988

**A. J. Timmerman
Ontario Ministry of Natural Resources
Lake Erie Fisheries Assessment Unit**



**Ministry of
Natural
Resources**
Lyn McLeod
Minister

© 1989, Queen's Printer for Ontario

Printed in Ontario, Canada

Additional copies of this publication are obtainable
only from:

Ministry of Natural Resources
Lake Erie Fisheries Assessment Unit
R.R. #2
Wheatley, Ontario
NOP 2P0
(519-825-4623)

TABLE OF CONTENTS

LIST OF TABLES.....	iv
ABSTRACT.....	v
INTRODUCTION.....	1
DESCRIPTION OF THE STUDY AREA.....	1
METHODS.....	3
Roving Incomplete-trip Design: 1978-1982.....	3
Access Point Complete-trip Design: 1982-1988.....	4
Data Analysis.....	5
RESULTS AND DISCUSSION.....	6
Distribution of Angling Effort	6
Yellow Perch Fishery	7
Catch and Harvest.....	7
Catch Per Unit of Effort.....	8
Biological Data.....	9
Incidental Species	10
Rainbow Smelt.....	10
Northern Pike.....	10
Other Species.....	11
Angler Residency	11
Use of Commercial Ice-huts.....	11
RECOMMENDATIONS.....	12
ACKNOWLEDGEMENTS.....	12
REFERENCES.....	13
TABLES.....	15
APPENDICES.....	29

LIST OF TABLES

Table		Page
1	Creel survey schedule in Inner Long Point Bay, Lake Erie, 1988.	15
2	Periods of commercial fish hut operation and creel survey sampling in the winter ice fishery on Inner Long Point Bay, Lake Erie, 1978-1988.	16
3	Estimated angling effort and mean angling effort per day for the winter ice fishery on Inner Long Point Bay, Lake Erie, 1978-1988.	17
4	Distribution of estimated angling effort by day-type during the winter ice fishery on Inner Long Point Bay, Lake Erie, 1978-1988.	18
5	Distribution of estimated angling effort by survey period during the winter ice fishery on Inner Long Point Bay, Lake Erie, 1978-1982.	19
6	Estimated catch and harvest (in numbers) for the Inner Long Point Bay winter ice fishery, 1978-1988.	20
7	Distribution of catch and harvest statistics for yellow perch by day-type and for the entire sampling period in the winter ice fishery of Inner Long Point Bay, Lake Erie, 1978-1988.	21
8	Distribution of catch and harvest statistics for yellow perch by survey-period in the winter ice fishery on Inner Long Point Bay, Lake Erie, 1978-1982.	22
9	Catch per unit of effort (CUE) by species and month during the winter ice fishery on Inner Long Point Bay, Lake Erie, 1978-1988.	23
10	Catch per unit of effort (CUE) for yellow perch by day-type in the winter ice fishery on Inner Long Point Bay, Lake Erie, 1978-1988.	24
11	Catch per unit of effort (CUE) for yellow perch by survey-period in the winter ice fishery on Inner Long Point Bay, Lake Erie, 1978-1982.	25
12	Year-class composition, mean length (cm), mean weight (g) and mean age of yellow perch harvested during the Inner Long Point Bay winter ice fishery, 1978-1988.	26
13	Residency status of anglers in the winter ice fishery in Inner Long Point Bay, Lake Erie, 1978-1988.	27
14	Percentage of anglers using commercial ice-huts in the winter ice fishery on Inner Long Point Bay, 1988.	28

ABSTRACT

During the period 1978 to 1988, winter angler surveys were conducted in Inner Long Point Bay in 1978, 1979, 1980, 1982, 1984, 1985, 1986 and 1988 at St. Williams and in 1982 and 1988 at Port Rowan. An average of 526 angling party interviews were conducted per survey at St. Williams.

Anglers expended from 26,079 to 126,900 rod-hours (mean = 77,340) at St. Williams and from 906 to 16,513 rod-hours (mean = 8,710) at Port Rowan per year.

On average anglers caught an estimated 250,276 yellow perch (Perca flavescens) and harvested an estimated 188,444 yellow perch per year at St. Williams. At Port Rowan, an estimated 30,294 yellow perch were caught of which 21,563 were harvested. Yellow perch were the "target" species and constituted 95% of the total catch and 96% of the harvest for the period surveyed. Yellow perch angler success rates were highest from 1979 to 1984 (mean = 5.870) and have been relatively low since 1985 (mean = 1.678). Yellow perch angler success rates were higher at St. Williams than at Port Rowan. Three- and four-year-old fish dominated the yellow perch harvest.

Rainbow smelt (Osmerus mordax) and northern pike (Esox lucius), which were considered to be caught incidentally, constituted 5% and 0.13% respectively of the total catch by number.

Residents of Ontario constituted 95 to 100% of the anglers interviewed per year.

INTRODUCTION

Data concerning the winter ice-fishery on Inner Long Point Bay are available since 1959 (Sztramko and Paine 1982); however, estimates of total effort and harvest are available only since 1978. This report documents methods and results of winter creel surveys on Inner Long Point Bay for the period 1978-1988.

The objectives of the creel surveys were:

1. to quantify the angling catch and harvest particularly of yellow perch (Perca flavescens);
2. to estimate angling effort and angling success rates;
3. to monitor the age and length composition of the yellow perch harvest; and
4. to determine angler residency.

DESCRIPTION OF THE STUDY AREA

Inner Long Point Bay (latitude 42°37'N, longitude 80°24'W) is situated at the western end of Long Point Bay on the north shore of the eastern basin of Lake Erie (Figure 1). The Bay is separated from Lake Erie by the Long Point peninsula which curves southeastward from the north shore. The shallow Inner Bay (mean depth = 1.0 m) is separated from the deeper Outer Bay by a partially submerged sandy shoal that extends from Turkey Point to Pottohawk Point.

The Inner Bay comprises an area of approximately 6,979 hectares (11.3 km by 8 km) and is situated about 24 km south-southwest of the Town of Simcoe in the Regional Municipality of Haldimand-Norfolk. Marshes border the Bay, particularly along the southern shore (Long Point peninsula) and along the north-east shore (Turkey Point marsh). The limnology of the Inner Bay has been described by Leach (1981) who classified it as eutrophic.

According to Whillans (1977), ice fishing has been carried out on Inner Long Point Bay since the 1800's, but not intensively until after the Second World War. The vast majority of the winter fishery is concentrated near the villages of St. Williams and Port Rowan.

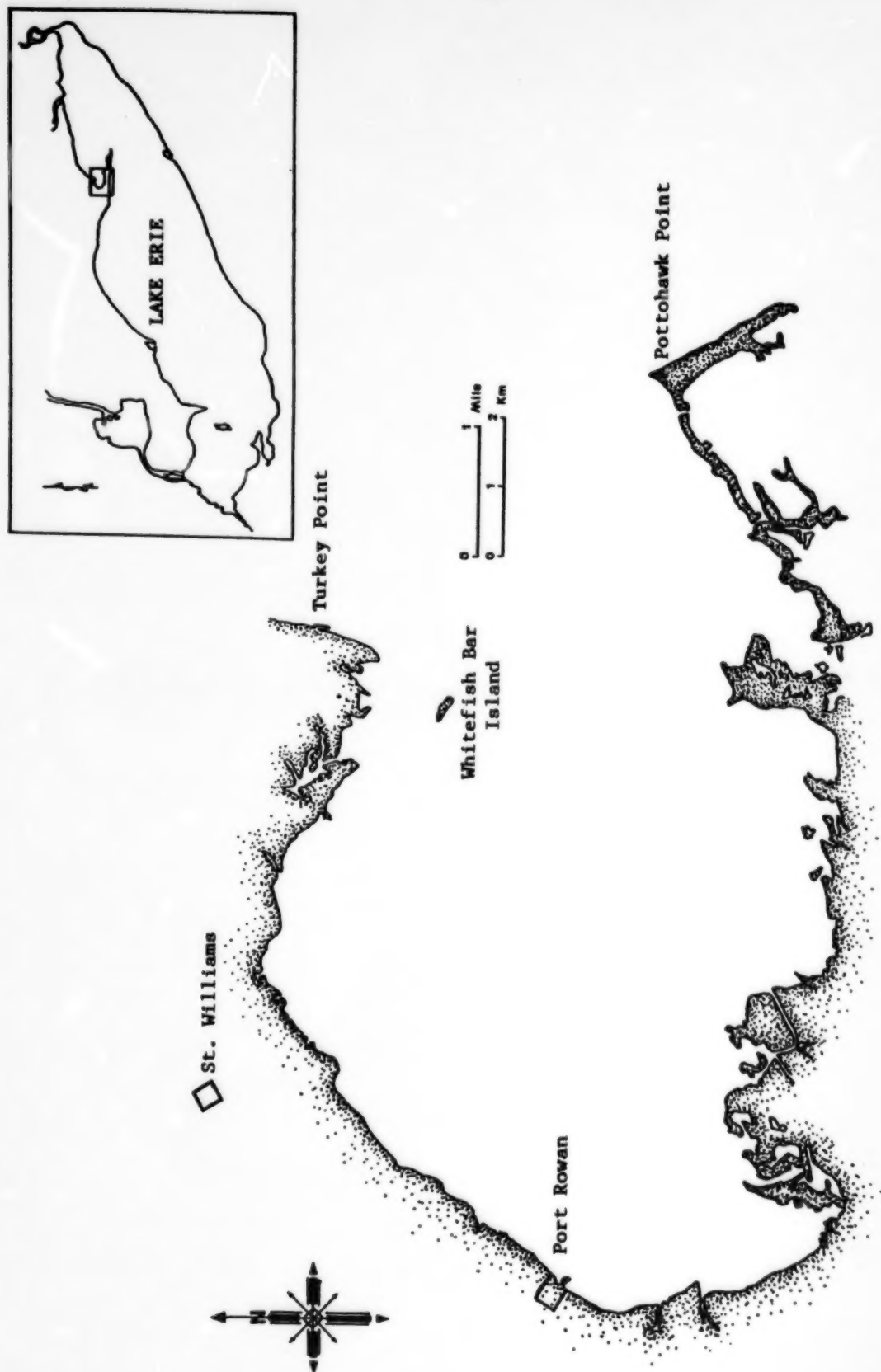


Figure 1. The study area.

METHODS

During the period 1978 to 1988, two types of creel survey designs were employed to monitor the Inner Long Point Bay ice fishery. From 1978 to and including the first half of the 1982 survey, a roving incomplete-trip design was used. The second half of the 1982 survey and all years thereafter were surveyed by means of an access point complete-trip design. Surveys were not conducted in 1981, 1983 and 1987.

Roving Incomplete-Trip Design: 1978-1982

Weekend days, weekdays, mornings (AM) and afternoons (PM) were considered as separate strata and were sampled at prescheduled times. General survey procedures have been previously described by Lockhart (1981) and were as follows:

- 1) The creel survey was conducted as a "walking creel" by one creel survey clerk on each sampling day. On most sampling days there was only one survey period, (either AM or PM); however, to achieve the desired sampling intensity and thus reduce sampling error, both the AM and PM periods were sampled occasionally on designated sampling days.
- 2) The clerk began the sampling day by making an initial count of Huts-in-use and then proceeded in a circular direction (alternating in a clockwise and counter-clockwise direction every other sampling day) to interview PARTIES from a representative sample of huts-in-use. Each party consisted of one or more anglers fishing together. Sufficient time was reserved for a second hut count following the completion of interviews. Each group of anglers fishing in the open without a hut was treated as one hut-in-use. Active huts and anglers without huts were interviewed in the same proportions as they existed in the fishery as determined during the counts.
- 3) The number of interviews was not predetermined and their frequency was left to the discretion of the survey clerk, to allow sufficient time for completing the second count within the designated time period.
- 4) Catch and harvest (number of fish kept) were determined and angling effort was expressed in terms of number of rods (lines) used and the length of time fished up to the interview. This information along with angler residency data was collected on the standard MNR SF-150 creel survey forms.
- 5) Representative scale samples and length and weight measurements were randomly taken from a target number of yellow perch and all the northern pike (Esox lucius) encountered. Also, cleithra from all northern pike were also removed and enclosed within the scale envelope.
- 6) Prior to 1982, only the traditional and largest fishing area off St. Williams was surveyed. In 1982, the smaller but growing fishing area off Port Rowan was also included in the survey.

Access Point Complete-Trip Design: 1982-1988

Following a review of technical difficulties encountered in conducting the Inner Long Point Bay winter creel survey in 1982, the creel survey design and procedures were changed midway through that year from a roving incomplete-trip design to an access point complete-trip design. The access point survey became the standard design on February 5, 1982 and has been used in all subsequent surveys. No survey was operated in 1983 and 1987. A complete-trip creel survey is the preferred method in areas where access to a fishery is largely restricted to one or a few access points such as in Inner Long Point Bay.

Technical advantages gained in making this design change included eliminating the need for specialized equipment such as snowmobiles, which are vulnerable to breakdown, and minimizing the exposure of the survey clerk to harsh weather conditions.

The statistical advantages of a complete-trip survey are three-fold. First, it eliminates the assumption inherent in incomplete-trip designs that there are no significant differences between incomplete-trip and complete-trip catch per unit of effort (CUE). Second, estimates of angling pressure will be improved by dispensing with the need to count huts-in-use. The large number of huts typically present (≈ 1000) in Inner Bay and uncertainties in whether or not a hut was occupied were problems of the former survey design that affected the survey clerk's ability to make timely and accurate counts. Third, by having survey clerks situated at access points, a large number of interviews could be completed thus enabling more intense sampling of the ice fishery than was possible in a roving type survey (pers. comm. L. Sztramko).

In 1982, weekend days, weekdays, mornings (AM) and afternoons (PM) were treated as separate strata and were sampled at prescheduled times. Commencing in 1984, stratification by day period (AM vs. PM) was discontinued and each sampling day then consisted of one period commencing at 1030 h or 1100 h and ending at 1730h or 1800 h. Start times earlier than 1000 h were considered impractical because of the minimal number of departures before that time.

The 1988 creel survey schedule is outlined in Table 1. All weekends were scheduled for sampling. During the first weekend of the survey, both Saturday and Sunday were sampled. On all subsequent weekends, sampling was alternated between Saturday and Sunday. Week-days were chosen systematically and were sampled as follows:

Week 1	Monday and Thursday	
Week 2	Tuesday and Friday	
Week 3	Wednesday	
Week 4	Monday and Thursday	... Etc.

This pattern was continued in scheduling the remaining weekdays and resulted in five weekdays sampled in each three-week period.

The sampling schedule was identical for both St. Williams and Port Rowan.

General survey procedures were as follows:

- 1) Considering the magnitude of the fishery and the potentially heavy volume of traffic, it was determined that a two person creel survey crew would be required at any time the survey was conducted at the traditional and largest access point at St. Williams. Monitoring of the smaller fishery off Port Rowan would be done by one person. Check point stations were established at these access points.
- 2) During each sampling period, counts were made of INDIVIDUAL ANGLERS coming off the ice at each access point, i.e., those who had completed their fishing day.
- 3) A representative sample of PARTIES was interviewed to obtain information on catch, effort, angler residency and angler type.
- 4) Representative scale samples and length and weight measurements were randomly taken from a target number of yellow perch and all the northern pike encountered. Cleithra from all northern pike were also removed and enclosed within the scale envelope.

Data Analysis

Survey data for the years 1978 to 1984 were analysed using a computer program developed by the Lake Erie Fisheries Assessment Unit (Petzold 1979, 1983). Since 1985, data have been analysed using the Ontario Ministry of Natural Resources provincial creel survey analysis program - CREESYS (Lester and Trippel 1985). Catch, harvest and effort estimates were derived from observed values of the same.

Effort was reported in rod-hours and in angler-hours; however, the measure of rod-hours was used to derive catch and harvest estimates because it was considered to be a more accurate measure of effort. Not all "anglers" fished and some used more than one rod (two lines per angler are generally allowed for ice-fishing in Ontario). Angler-hours may be more appropriately termed "user-hours", a measure of participation in a fishery (Sztramko and Paine 1984).

Catch per unit of effort (CUE) was calculated by dividing the actual (observed) number of a species caught by the actual (observed) total number of rod-hours expended in capturing those fish. This, the unweighted CUE, was used in this report as a measure of relative abundance and is used to interpret the distribution of catch and effort in the fishery.

Estimates for the 1982 survey are the result of two sub-surveys conducted in that year. Number of days sampled, number of parties interviewed and estimates of effort, catch and harvest are the sum of values collected during each sub-survey. CUE for separate strata and for all strata combined are the weighted means of CUE's derived from each sub-survey.

Catch, harvest and CUE estimates are for "all anglers". Yellow perch were assumed to be the target species and all other species were considered to be caught incidentally.

RESULTS AND DISCUSSION

Winter creel surveys were conducted on Inner Long Point Bay during eight of the eleven years from 1978 to 1988. Surveys were not conducted in 1981, 1983, and 1987 because of funding shortages or unsafe ice conditions and associated minimal ice fishing activity. Surveys were conducted for an average of 56 days per year surveyed.

The traditional and largest fishery off St. Williams was surveyed during all eight years that the surveys were conducted, while the smaller fishery off Port Rowan was surveyed in 1982 and 1988 only. Survey results from these two areas are presented separately to facilitate comparisons between areas and among years.

Estimates of angler effort, catch, harvest and CUE at St. Williams were derived from an average of 526 party interviews per year (Table 2). Catch, harvest and CUE estimates are available only for yellow perch and northern pike for all years surveyed; catches (or harvests) of rainbow smelt (*Osmerus mordax*) and some other incidental species were not always determined.

Distribution of Angling Effort

Estimated angling effort at the St. Williams fishery (mean = 77,340 rod-hours) ranged from a low of 26,079 rod-hours in 1988 to a high of 126,900 rod-hours in 1979 (Table 3). These variations in total angling effort were largely a result of the length of the fishable season (Table 2), which was dependent on ice conditions. Estimates of mean daily effort (mean rod-hours/day) provide the best indication of angling pressure trends because they are independent of the length of the fishable season. No consistent trend in fishing pressure is apparent from the data (Table 3). Mean effort at St. Williams in 1988 was the lowest recorded in the study period and is thought to reflect varying ice conditions. Even though the fishable season was relatively long, commercial hut operators ceased their operations three times before the end of the fishing season. These periods of no activity were not taken into account in calculations of mean effort in 1988 nor in any other year that this condition occurred.

Estimated angling effort at the Port Rowan fishery constituted 19% and 3% of the effort expended off St. Williams in 1982 and 1988 respectively (Table 3). During both years, and especially in 1988, the length of the fishable season was shorter at Port Rowan than at St. Williams (Table 2). In terms of mean daily effort (mean rod-hours per day) during the fishable season, angling effort expended at Port Rowan was 30% and 21% of the effort expended off St. Williams in 1982 and 1988 respectively (Table 3).

From 1978 to 1982, total angling effort at St. Williams was slightly higher on weekdays than on weekend days; however, since 1984, the reverse was true (Table 4). In 1988, 72% of angling effort at St. Williams was expended on weekend days. Mean daily angling effort was on average 3.6 times higher on weekend days than on weekdays at St. Williams between 1978 and 1988.

Total angling effort was higher on weekend days than weekdays at Port Rowan in both 1982 and 1988 (Table 4). Mean daily angling effort was 5.2 and 7.6 times higher on weekend days than on weekdays in 1982 and 1988 respectively. These data show that Port Rowan was utilized by a greater proportion of weekend anglers than St. Williams.

Afternoon (PM) angling was only slightly more popular than morning (AM) angling in 1978 and 1980 at St. Williams (Table 5). However, in 1982, mean effort during afternoons was more than four times greater than in mornings at St. Williams and nine times greater at Port Rowan. Data are not available for other years.

Yellow Perch Fishery

Catch and Harvest

During those years between 1978 and 1988 in which estimates were obtained for all species (including rainbow smelt) yellow perch constituted 95% of the catch and 96% of the harvest (Table 6). On average, an estimated 250,276 yellow perch (range = 28,903 to 532,306) were caught annually off St. Williams of which an average of 188,444 were harvested (kept) each year. For the period 1978 to 1988, approximately 1.8 times as many yellow perch were caught and 2.8 times as many yellow perch were harvested during the winter ice fishery off St. Williams than the summer boat fishery in Long Point Bay (Appendix I).

Total catch was dependent on the length of the fishing season and on angler success rates.

Yellow perch catch, harvest (Table 6) and mean harvest (Table 7) was highest from 1979 to 1984.

Total yellow perch harvest at Port Rowan was 12% and 2% of the total harvest at St. Williams in 1982 and 1988 respectively; however, mean harvest per day during the fishable season at Port Rowan was 18% and 15% of mean harvest at St. Williams in 1982 and 1988 respectively.

The proportion of the catch that was harvested varied from 60% to 80% (mean = 68%) among years (Table 6). Hamley et al. (1981) found that from 1975 to 1980, the percent of yellow perch retained varied inversely with the catch rate. Anglers appeared to be less selective about fish size when success rates and catches were low. Data from 1978 to 1988 show the same general trend; however, another factor was thought to be involved. Low retention rates in 1980 and 1985 were likely a result of the predominance of small three-year old fish in the catch in those years (Table 12).

From 1978 to 1984, anglers caught and harvested more yellow perch at St. Williams through the week than on weekends (Table 7). However, with an increasing proportion of the effort being exerted on weekends since 1984 (Table 4), in 1985 and 1988 more yellow perch were caught and harvested on weekends (Table 7). Mean daily catch averaged 31% higher on weekend days than on weekdays.

At Port Rowan in 1982, anglers caught and harvested more yellow perch through the week than on weekends (Table 7) despite a greater expenditure of effort (131%) on weekends (Table 4). However, mean daily catch was 42% higher on an average weekend day than on an average weekday (Table 7). In 1988 at Port Rowan, anglers caught 2.7 times as many yellow perch on weekends as on weekdays and mean daily catch was 31% higher on weekend days than on weekdays.

Yellow perch catch and harvest was only slightly higher in the afternoon (PM) than in the morning (AM) survey-periods in 1978 and 1980 at St. Williams (Table 8). However, with the increased proportion of angling effort expended during the afternoons at both St. Williams and Port Rowan in 1982 (Table 5), catches were 5.6 and 6.5 times greater during afternoons than mornings at St. Williams and Port Rowan respectively in 1982 (Table 8). Data are not available for other years.

Catch Per Unit of Effort

Catch per unit of effort for yellow perch for the years 1978 to 1988 is presented in Table 9 and Figure 2. Mean CUE for this period at St. Williams was 3.748 yellow perch per rod-hour. In years when both a winter and a summer survey were operated, CUE during the winter fishery was on average 1.8 times greater than during the summer boat fishery (Appendix I). Yellow perch CUE's were highest from 1979 to 1984 (mean = 5.870 yellow perch per rod-hour) and declined to a low of 0.681 in 1985. In recent years (1986 and 1988), CUE's have improved slightly but have not approached the 1979 to 1984 levels. Average CUE of yellow perch was highest in 1980 at St. Williams (8.725) due to the high percentage (>75%) of three-year-old fish from the very strong 1977 year class (Table 12). This represents the highest CUE recorded since records were first kept in 1959 (Sztramko and Paine 1982).

Yellow perch CUE was higher at St. Williams than at Port Rowan in both 1982 and 1988 (Table 9).

In seven out of eight years surveyed at St. Williams, the CUE was higher in February than in January (Table 9). In all of the years during which there was a fishery in March, CUE's were highest in that month.

At both St. Williams and Port Rowan, CUE's were higher during weekdays than weekend days during all years surveyed (Table 10).

The CUE was higher in the morning (AM) than in the afternoon (PM) at St. Williams in 1978 and 1980 and at Port Rowan in 1982 (Table 11). The CUE was higher in the afternoon (PM) than in the morning (AM) at St. Williams in 1982. Data are not available for other years.

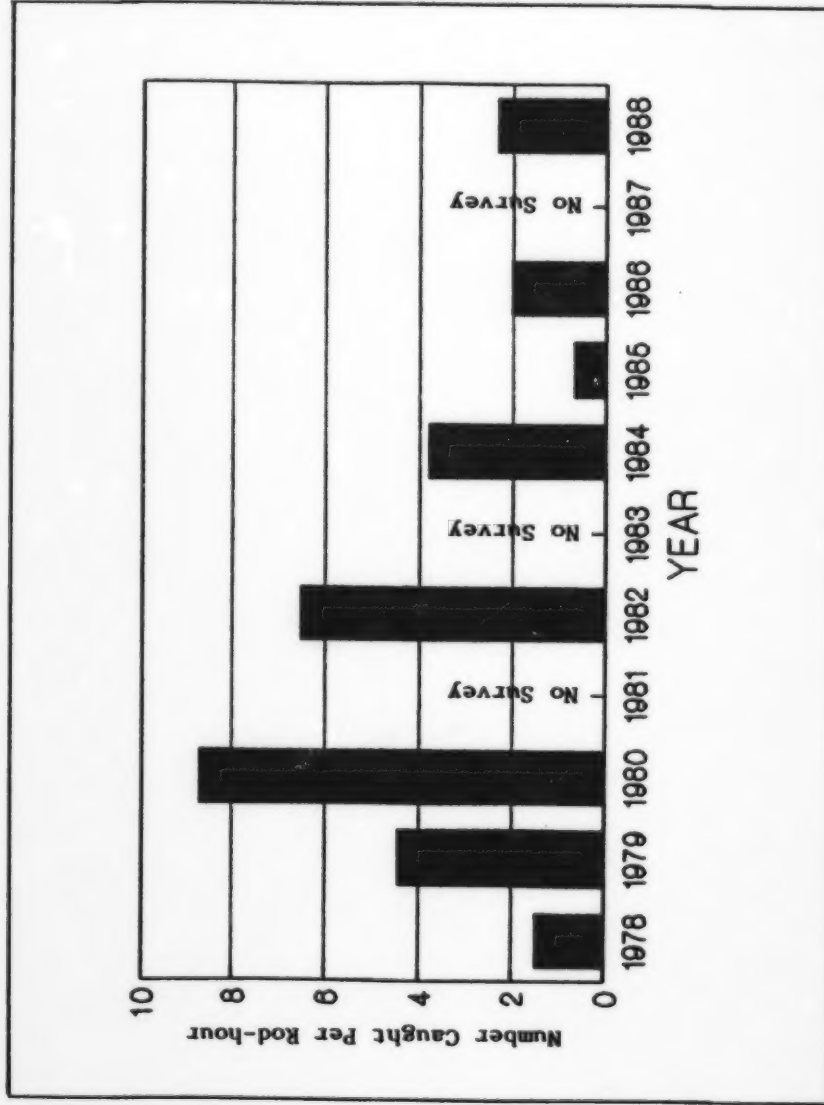


Figure 2. Catch per unit of effort (CUE) for yellow perch caught in the winter ice fishery on Inner Long Point Bay, Lake Erie, 1978-1988.

Biological Data

Three-year-old yellow perch contributed the most to the angler harvest in four of the six years in which sufficient samples were obtained; four-year-olds contributed the most in the other two years (Table 12). Mean length, weight and age are also presented for each year. Mean age of harvested yellow perch has steadily increased from 1980 to 1988.

Incidental Species

Rainbow Smelt

During years between 1978 and 1988 for which estimates were made, rainbow smelt constituted an average of 5% of the catch and 4% of the harvest (Table 6). Hamley et al (1981) reported that rainbow smelt were seldom recorded in the catch before 1976, but their harvest has increased since. In 1980, rainbow smelt constituted 10% of the catch and 7% of the harvest at St. Williams (Table 6). For those years for which data are available, anglers caught an average of 12,526 rainbow smelt and harvested an average of 8,136 rainbow smelt per year.

The proportion of the catch that was harvested varied from 51 to 99% and appeared to be influenced by catches and CUE's of yellow perch (Table 6). In 1978 and 1986 when yellow perch catches and CUE's (Table 9) were low, a high proportion of the smelt catch was harvested (99% and 82% respectively). In 1980 and 1984 when yellow perch catches and CUE's were higher, a relatively lower proportion of the rainbow smelt catch was harvested (37% and 63% respectively).

Catches of rainbow smelt per unit of yellow perch effort rose to a high of 0.992 in 1980 and have declined every year since (Table 9). In all of the years surveyed, CUE's were highest in January.

Biological data were not obtained from the rainbow smelt harvest.

Northern Pike

Northern pike were caught every year and constituted 0.13% of the total catch and harvest by number between 1978 and 1988 (Table 6). Anglers caught an average of 240 northern pike per year at St. Williams and 22 per year at Port Rowan. Most (91%) of the northern pike caught were harvested.

Catches of northern pike per unit of yellow perch effort ranged from a high of 0.025 in 1980 to a low of 0.001 in 1979 (Table 9).

Biological data collected from the northern pike harvest were too limited to warrant analysis.

Other Species

Other species collectively constituted less than 0.1% of the catch and harvest between 1978 and 1988 (Table 6). These have included:

Bowfin	<u>Amia calva</u>
Common carp	<u>Cyprinus carpio</u>
Bullheads	<u>Ictalurus sp.</u> (other than <u>I. punctatus</u>)
White perch	<u>Morone americana</u>
Rock bass	<u>Ambloplites rupestris</u>
Sunfish	<u>Lepomis sp.</u>
Smallmouth bass	<u>Micropterus dolomieu</u>
Largemouth bass	<u>Micropterus salmoides</u>
Walleye	<u>Stizostedion vitreum vitreum</u>

Angler Residency

Residents of Ontario constituted 95-99% of anglers interviewed at St. Williams from 1978 to 1988 and 100% of the anglers interviewed at Port Rowan (Table 13). Residents of the Regional Municipality of Haldimand-Norfolk constituted 46% of the anglers interviewed at St. Williams and 60% of the anglers interviewed at Port Rowan in 1988. All Ontario residents originated from the area south of a line from Grand Bend to Brampton in 1988.

Use of Commercial Ice-Huts

The percentage of anglers using commercial ice-huts in 1988 is shown in Table 14. Thirty-five percent of the anglers used commercial ice-huts at St. Williams and Port Rowan combined. In 1988, some 126 ice-huts were offered for rent by seven commercial operators.

RECOMMENDATIONS

1. Continue to monitor the winter ice-fishery in Inner Long Point Bay by using the access point complete-trip method at St. Williams and Port Rowan.
2. Determine the extent and magnitude of the fishery developing between St. Williams and Port Rowan adjacent to a commercial ice-hut rental operation. On January 24, 1988, an observer noted 50-60 huts at this location. Continued development of this fishery may warrant its inclusion in future surveys.
3. At St. Williams, a substantial but unknown number of anglers and vehicles enter and exit the ice fishery via Booth's Harbour situated a short distance to the north-east of the existing creel survey check station. Preliminary studies should be conducted to determine the feasibility of counting these anglers at the St. Williams check station using binoculars.

ACKNOWLEDGEMENTS

Winter creel surveys on Inner Long Point Bay were a cooperative effort of the Lake Erie Fisheries Assessment Unit and the Simcoe District of the Ministry of Natural Resources. Since 1978, numerous staff from both offices have been involved in collecting survey data, verifying field forms and entering, editing and analyzing data.

Nancy Drummond aged the scale samples and Debbie Schroeder typed the manuscript. Rob MacGregor and Les Sztramko provided guidance in the preparation of this report and Ross Hyatt, Jerry Paine, Dave Reid, Les Sztramko and Larry Witzel reviewed it.

REFERENCES

- Hamley, J.M., J.C. Lockhart, and D.J. Reid. 1981. Sport Fishing in Long Point Bay, p. 53-70. In J.M. Hamley (ed.) Summary of Nanticoke Fish Studies. Ontario Ministry of Natural Resources, Port Dover, Ontario. (unpublished).
- Leach, J.H. 1981. Comparative limnology of Inner Long Point Bay, Lake Erie, and adjacent waters of the Outer Bay. Journal of Great Lakes Research 7: 123-129.
- L.E.F.A.U. 1978 - 1988. Computer analysis of creel census data for the years 1978 to 1988, on Long Point Bay, Lake Erie, Lake Erie Fisheries Assessment Unit, Ontario Ministry of Natural Resources, London, Ontario.
- Lester, N.P. and E.A. Trippel. 1985. CREESYS User Manual. Ontario Ministry of Natural Resources, Fisheries Branch, Toronto.
- Lockhart, J.C. 1981. Inner Long Point Bay creel census data report, summer 1971 to winter 1979. Ontario Ministry of Natural Resources, Port Dover. 30pp. (unpublished draft)
- MacGregor, R.B. and L.D. Witzel. 1987. A twelve year study of the fish community in the Nanticoke region of Long Point Bay, Lake Erie: 1971-1983 summary report. Lake Erie Fisheries Assessment Unit Report 1987-3. Ontario Ministry of Natural Resources. 616pp.
- Miller, D. 1983. 1981 summer creel census on Long Point Bay, Lake Erie. Unpublished report, Ontario Ministry of Natural Resources, Simcoe District. 40pp.
- Owen, K. 1980. 1980 summer creel census on Long Point Bay, Lake Erie. Unpublished report, Ontario Ministry of Natural Resources, Simcoe District. 54 pp.
- Petzold, M. 1979. APL Programs for creel survey data. Lake Erie Fisheries Assessment Unit Report 1980-4. Ontario Ministry of Natural Resources. 49pp.
- Petzold, M. 1983. APL Programs for creel survey data (revised). Lake Erie Fisheries Assessment Unit. Ontario Ministry of Natural Resources.
- Powell, S.D. 1980. Summer creel census on Long Point Bay, Lake Erie, 1979. Unpublished report, Ontario Ministry of Natural Resources, Simcoe District, 45pp.
- Reid, D.J. 1984a. Summer creel census in Long Point Bay, Lake Erie, 1982. Unpublished report, Ontario Ministry of Natural Resources, Simcoe District, 46pp.

- Reid, D.J. 1984b. Summer creel census in Long Point Bay, Lake Erie, 1983. Unpublished report, Ontario Ministry of Natural Resources, Simcoe District, 53pp.
- Sztramko, L., and J.R. Paine. 1982. Sport fishery data for the Canadian portion of Lake Erie and connecting waters, 1948-80. Lake Erie Fisheries Assessment Unit Report 1982-3. Ontario Ministry of Natural Resources, 88pp.
- Whillans, T.H. 1977. Fish community transformation in three bays within the lower Great Lakes. M. Sc. Thesis, University of Toronto, 328pp.

Table 1. Creel survey schedule in Inner Long Point Bay, Lake Erie, 1988.^{a,b}

Date	Day	Date	Day
January 9	Saturday	February 7	Sunday
January 10	Sunday	February 9	Tuesday
January 11	Monday	February 12	Friday
January 14	Thursday	February 13	Saturday
January 16	Saturday	February 17	Wednesday
January 19	Tuesday	February 21	Sunday
January 22	Friday	February 22	Monday
January 24	Sunday	February 25	Thursday
January 27	Wednesday	February 27	Saturday
January 30	Saturday		
February 1	Monday	March 1	Tuesday
February 4	Thursday	March 4	Friday
		March 6	Sunday

^a Creel survey schedule was identical for both St. Williams and Port Rowan.

^b Sampling concluded at Port Rowan on January 16.

Table 2. Periods of commercial fish hut operation and creel survey sampling in the winter ice fishery on Inner Long Point Bay, Lake Erie, 1978-1988.^{a,b,c}

Year	Commercial Huts ^d	No. of Days of Hut Operation	Sampling Period	Length of Sampling Period (Days)	No. of Days Sampled	No. of Parties Interviewed
1978	Jan. 1 - Mar. 12	71	Jan. 5 - Mar. 11	66	22	421
1979	Jan. 6 - Mar. 4	58	Jan. 9 - Mar. 4	56		419
1980	Jan. 26 - Feb. 23	29	Jan. 19 - Feb. 28	41	16	376
1981	Dec. 26 - Feb. 18	55				
1982	Jan. 12 - Mar. 11	59	Jan. 14 - Mar. 15 (Jan. 30 - Mar. 9)	61 (39)	23 (10)	337 (98)
1983	Jan. 21 - Jan. 23	3				
1984	Dec. 28 - Feb. 14	49	Jan. 3 - Feb. 18	47	26	1,259
1985	Jan. 15 - Feb. 10 Feb. 17 - Feb. 24	35	Jan. 12 - Feb. 24	44	17	302
1986	Dec. 28 - Mar. 12	75	Jan. 8 - Mar. 16	68	25	511
1987	Jan. 27 - Feb. 7	12				
1988	Jan. 8 - Jan. 19 Jan. 22 Jan. 28 - Jan. 31 Feb. 4 - Mar. 1	44	Jan. 8 - Mar. 8 (Jan. 8 - Jan. 17)	61 (10)	24 (5)	426 (57)

^a Missing values indicate that either surveys were not conducted or that required data are unavailable.

^b All data are unpublished data from L.F.F.A.U. (1978-88) except 1979 which is from Lockhart (1981).

^c Values within parentheses represent data from Port Rowan. All other values are for St. Williams.

^d Data from MacGregor and Witzel (1987) and pers. comm. F. and S. Howe.

Table 3. Estimated angling effort and mean angling effort per day for the winter ice fishery on Inner Long Point Bay, Lake Erie, 1978-1988.^{a,b,c,d}

Year	Estimated Effort		Mean Effort Rod-hours/day
	Angler-hours	Rod-hours	
1978	108,293	108,890	1,650
1979		126,900	2,266
1980	46,591	47,629	1,161
1981			
1982	85,237 (14,519)	85,801 (16,513)	1,407 (423)
1983			
1984	97,115	103,858	2,209
1985	27,844	40,522	921
1986	60,018	79,040	1,162
1987			
1988	22,398 (755)	26,079 (906)	428 91

^a Mean effort represents the total rod-hours divided by the corresponding number of days in the sampling period.

^b All data are unpublished data from L.E.F.A.U. (1978-88) except 1979 which is from Hamley et al. (1981).

^c Values within parentheses represent data from Port Rowan. All other values are for St. Williams.

^d Missing data indicate that either surveys were not conducted or that required data were unavailable.

Table 4. Distribution of estimated angling effort by day-type during the winter ice fishery on Inner Long Point Bay, Lake Erie, 1978-1988.^{a,b,c,d,e}

Year	Day-type					Study Period	
	Weekday			Weekend Day			
	Effort	Mean Effort	Percent of Total	Effort	Mean Effort		Percent of total
1978	54,944	1,169	50	53,946	2,839	50	108,890
1979							126,900
1980	24,433	843	51	23,197	1,933	49	47,629
1981							
1982	47,444 (4,986)	1,103 (185)	55 (30)	38,357 (11,527)	2,131 (961)	45 (70)	85,801 (16,513)
1983							
1984	49,017	1,442	47	54,841	4,219	53	103,858
1985	11,575	386	29	28,947	2,068	71	40,522
1986	28,079	585	36	50,961	2,548	64	79,040
1987							
1988	7,344 (150)	171 (25)	28 (17)	18,735 (756)	1,041 (189)	72 (83)	26,079 (906)

^a Effort estimated in rod-hours.

^b Mean effort represents the total rod-hours per day-type divided by the corresponding number of days per day-type in the sampling period.

^c Values within parentheses represent data from Port Rowan. All other values are for St. Williams.

^d Missing data indicate that either surveys were not conducted or that required data were unavailable.

^e All data are unpublished from L.E.F.A.U. (1978-88) except 1979 which is from Hamley et al (1981).

Table 6. Estimated catch and harvest (in numbers) for the Inner Long Point Bay winter ice fishery, 1978-1988. a,b,c

Year	Yellow Perch			Rainbow Smelt			Northern Pike			Other		Total	
	Catch	Harvest	% Kept	Catch	Harvest	% Kept	Catch	Harvest	% Kept	Catch	Harvest	Catch	Harvest
1978	150,909	120,813	80	5,395	5,340	99	271	271	100	289	80	156,864	126,504
1979		314,600			20,410			158			281		335,449
1980	442,888	264,219	60	50,620	18,609	37	393	245	62	260	260	494,161	283,333
1981													
1982	532,306 (59,154)	359,506 (42,221)	68 (71)				41 (39)	41 (39)	100 (100)	194	194	532,541 (59,193)	359,741 (42,260)
1983													
1984	379,464	275,954	73	4,269	2,672	63	551	541	98	92	57	384,376	279,224
1985	28,903	18,973	66				66	64	97	12	12	28,981	19,049
1986	160,014	115,382	72	1,909	1,559	82	235	235	100	28	0	162,186	117,176
1987													
1988	57,445 (1,434)	38,109 (905)	66 (63)	438	223	51	123 (4)	123 (4)	100 (100)	59	17	58,065 (1,438)	38,472 (909)

a Values within parentheses represent Port Rowan. All other values are from St. Williams.

b All data are unpublished data from L.E.F.A.U. (1978-88) except 1979 which is from Hamley et al (1981).

c Missing values indicate that either surveys were not conducted or that required data are unavailable.

Table 7. Distribution of catch and harvest statistics for yellow perch by day-type and for the entire sampling period in the winter ice fishery of Inner Long Point Bay, Lake Erie, 1978-1988. a,b,c,d

Year	Day-type				Study Period							
	Weekday		Weekend-day		Catch	Harvest	Mean catch	Percent of total catch				
	Catch	Harvest	Mean catch	Percent of total catch								
1978	77,911	64,562	1,658	52	72,998	56,250	3,842	48	150,909	120,813	2,287	1,831
1979										314,600		5,618
1980	236,363	160,550	8,150	53	206,525	103,669	17,210	47	442,888	264,219	10,802	6,444
1981												
1982	346,991 (36,225)	216,765 (24,927)	8,070 (1,342)	65 (61)	185,315 (22,929)	142,740 (17,294)	10,295 (1,911)	35 (39)	532,306 (59,154)	359,506 (42,221)	8,726 (1,517)	5,894 (1,083)
1983												
1984	234,391	173,018	6,893	62	145,073	102,936	11,159	38	379,464	275,954	8,074	5,871
1985	13,617	8,996	454	47	15,286	9,977	1,092	53	28,903	18,973	657	431
1986	86,103	62,467	1,794	54	73,911	52,915	3,696	46	160,014	115,382	2,353	1,697
1987												
1988	28,344 (383)	19,410 (207)	659 (64)	49 (27)	29,101 (1,051)	18,699 (698)	1,617 (263)	51 (73)	57,445 (1,434)	38,109 (905)	942 (143)	625 (91)

a Catch and harvest estimates in numbers.

b All data are unpublished data from L.E.F.A.U. (1978-88) except 1979 which is from Hamley et al (1981).

c Values within parentheses represent Port Rowan. All other values are from St. Williams.

d Missing values indicate that either surveys were not conducted or that required data are unavailable.

Table 8. Distribution of catch and harvest statistics for yellow perch by survey-period in the winter ice fishery on Inner Long Point Bay, Lake Erie, 1978-1982.^{a,b,c}

Year	Survey-Period							
	AM				PM			
	Catch	Harvest	Mean catch	Percent of total catch	Catch	Harvest	Mean catch	Percent of total catch
1978	74,780	54,701	1,133	50	76,129	66,111	1,153	50
1979								
1980	212,075	133,578	5,173	48	230,813	130,641	5,630	52
1981								
1982	81,053 (7,864)	54,222 (4,570)	1,329 (202)	15 (13)	451,253 (51,290)	305,284 (37,651)	7,398 (1,315)	85 (87)

^a Catch and harvest estimates in numbers.

^b Values within parentheses represent Port Rowan. All other values are from St. Williams.

^c Missing values indicate that either surveys were not conducted or that insufficient data were collected.

Table 9. Catch per unit of effort (CUE) by species and month during the winter ice fishery on Inner Long Point Bay, Lake Erie, 1978-1988. a,b,c,d

Year	Yellow Perch				Rainbow Smelt				Northern Pike			
	January	February	March	Study Period	January	February	March	Study Period	January	February	March	Study Period
1978	0.890	1.826	1.851	1.469	0.119	0.028	0.001	0.056	0.005	0.001	0.004	0.003
1979	3.338	5.532	3.732	4.446	0.257	0.195	0.133	0.210	0.001	0.002	0.000	0.001
1980	5.575	10.117	-	8.725	1.661	0.696	-	0.992	0.077	0.002	-	0.025
1981												
1982	6.282 (1.538)	6.345 (4.475)	9.042 (0.975) ^e	6.525 (4.233)	-	-	-	-	-	0.002	-	0.002
1983												
1984	2.704	5.908	-	3.784	0.054	0.017	-	0.041	0.005	0.005	-	0.005
1985	0.676	0.684	-	0.681	-	-	-	-	0.003	0.002	-	0.002
1986	2.273	1.121	3.582	2.019	0.039	0.022	0.003	0.026	0.002	0.003	0.003	0.003
1987												
1988	1.644 (1.516)	1.840	8.145	2.334 (1.516)	0.021	0.012	0.002	0.016	0.002	0.006	0.008	0.004 (0.002)

a CUE is unweighted and is derived from the actual (observed) number of a species caught divided by the corresponding actual (observed) effort in rod-hours.

b All data are unpublished data from L.E.F.A.U. (1978-88) except 1979 which is from Lockhart (1981).

c Values within parentheses are for Port Rowan. All other values are for St. Williams.

d Missing values indicate that either surveys were not conducted or that required data are unavailable.

e Based on only 4 interviews.

Table 10. Catch per unit of effort (CUE) for yellow perch by day-type in the winter ice fishery on Inner Long Point Bay, Lake Erie, 1978-1988.^{a,b,c,d}

Year	Day-type		Study Period
	Weekday	Weekend-day	
1978	1.523	1.403	1.469
1979			4.446
1980	10.374	7.001	8.725
1981			
1982	7.905 (5.036)	5.188 (2.222)	6.525 (4.233)
1983			
1984	4.996	2.711	3.784
1985	1.075	0.537	0.681
1986	3.009	1.404	2.019
1987			
1988	4.134 (2.427)	1.594 (1.421)	2.334 (1.516)

^a CUE is unweighted and is derived from the actual (observed) number of yellow perch caught divided by the corresponding actual (observed) effort in rod-hours.

^b All data are unpublished data from L.E.F.A.U. (1978-88) except 1979 which is from Lockhart (1981).

^c Values within parentheses are for Port Rowan. All other values are for St. Williams.

^d Missing values indicate that either surveys were not conducted or that required data are unavailable.

Table 11. Catch per unit of effort (CUE) for yellow perch by survey-period in the winter ice fishery on Inner Long Point Bay, 1978-1982.^{a,b,c,d}

Year	Survey-Period		Study Period
	AM	PM	
1978	1.759	1.304	1.469
1979			4.446
1980	11.082	7.731	8.725
1981			
1982	5.967 (5.812)	6.655 (2.937)	6.525 (4.233)

^a CUE is unweighted and is derived from the actual (observed) number of yellow perch caught divided by the corresponding actual (observed) effort in rod-hours.

^b All data are unpublished data from L.E.F.A.U. (1978-88) except 1979 which is from Lockhart (1981).

^c Values within parentheses are for Port Rowan. All other values are for St. Williams.

^d Missing values indicate that either surveys were not conducted or that required data are unavailable.

Table 12. Year-class composition, mean length (cm), mean weight (g) and mean age of yellow perch harvested during the Inner Long Point Bay winter ice fishery, 1978-1988.

Year	% Comp. Length Weight	Age-Group						Mean Length	Mean Weight	Mean Age	Sample Size (n)
		II	III	IV	V	VI	VII	VIII			
1978		15.3	18.2	19.7							
1980	% Comp. Length Weight	2.4	75.5	19.6	2.0	0.5				3.2	204
			17.8	18.9	22.9	17.0		18.1			204
1982	% Comp. Length Weight	2.3	75.2	17.8	4.7					3.2	129
		17.3	17.4	18.9	19.2			17.8	72.5		129
		55.7	68.1	86.5	96.3						129
1984	% Comp. Length Weight	2.9	47.5	34.7	14.0	0.5	0.4			3.6	1,131
		15.3	18.3	19.9	21.5	21.9	27.7	19.2	77.3		1,131
		30.9	62.9	84.5	113.0	104.2	278.8				1,149
1985	% Comp. Length Weight	1.2	51.0	38.8	8.2	0.8				3.6	245
		15.5	17.5	19.3	21.0	23.0		18.6			245
		36.7	55.8	81.7	123.5	182.5			73.0		245
1986	% Comp. Length Weight	0.8	27.7	45.6	22.1	2.8	0.5			4.0	390
		14.6	18.0	19.6	20.9	21.9	24.6	19.5			390
							32.3				
1988	% Comp. Length Weight		2.3	83.0	12.7	1.8	0.3			4.1	393
			16.3	18.3	19.8	19.8	23.8	18.5			393
			51.7	70.0	91.7	92.0	177.0		72.9		393

a All data are from St. Williams.

b Missing values indicate that either surveys were not conducted or that required data were unavailable.

Table 13. Residency status of anglers in the winter ice fishery in Inner Long Point Bay, Lake Erie, 1978-1988.^{a,c,d}

Year	Anglers Interviewed				Percent of Total		
	Residents		Non-residents		Haldimand-Norfolk ^b	Ontario Residents	Non-Residents
	Haldimand-Norfolk ^b	Other Ontario	Ontario Residents	Non-residents			
1978			1,040	53		95	5
1979							
1980	901	78	979	0	92	100	0
1981							
1982			923 (244)	5 (0)		99 (100)	1 (0)
1983							
1984			3,007	0		100	
1985							
1986							
1987							
1988	464 (70)	536 (46)	1,000 (116)	6 (0)	46 (60)	99 (100)	1 (0)

^a "Resident" refers to anglers living in Ontario, while "Non-resident" applies to all other anglers.

^b Haldimand-Norfolk refers to the Regional Municipality of Haldimand-Norfolk.

^c Missing values indicate that either surveys were not conducted or that required data were unavailable.

^d Values within parentheses represent Port Rowan. All other values are from St. Williams.

Table 14. Percentage of anglers using commercial ice-huts in the winter ice fishery on Inner Long Point Bay, 1988.

Area	Day-type		Study Period
	Weekday	Weekend day	
St. Williams	42	36	38
Port Rowan	0	7	6
All Areas	40	33	35

Appendix I. Selected fishery statistics for yellow perch in the summer sport fishery in Long Point Bay, Lake Erie, 1978-1988.^{a,b}

Year	Effort (Rod-hours)	Catch (in number)	Harvest (in numbers)	CUE	Source
1978	N/A	94,394	49,446	1.369	LEFAU (1978)
1979	50,493	300,048	128,808	2.653	Powell (1980)
1980	43,883	247,494	98,894	3.238	Owen (1980)
1981	53,688	248,153	100,416	2.291	Miller (1983)
1982	103,891	159,292	75,453	1.429	Reid (1984a)
1983	72,864	182,704	73,517	2.054	Reid (1984b)
1984	55,657	152,427	59,477	1.421	LEFAU (1984)
1985	32,817	139,392	58,072	2.367	LEFAU (1985)
1986	34,654	124,571	60,441	2.117	LEFAU (1986)
1987	16,332	88,487	32,237	2.962	LEFAU (1987)
1988	7,088	33,567	11,563	2.060	LEFAU (1988)

^a Effort estimates are for anglers who fished specifically for yellow perch.

Catch and harvest estimates are for all anglers. CUE's are derived from observed catch and effort data for anglers who fished specifically for yellow perch.

^b The 1978 survey only included one week prior to bass season opening (June 24) whereas other years began in early May (1979, 1980, 1981, 1983, 1984, 1985), early June (1982) or on the opening day of the bass season (1986, 1987, 1988). The 1979 survey included part of September which accounted for 7% of the total effort expended and 15% of the total catch. The 1979 data for September were not included to allow for comparisons among years.

4270

(0.1 K P.R. 89.05.31)

ISBN 0-7729-4137-8